

Claims

1. A fuel cell stack comprising:

a cascaded fuel flow field having at least a first group of fuel cells receiving fuel from a source, a second group of fuel cells normally receiving fuel from said first group, and a third group of fuel cells normally receiving fuel from said second group of fuel cells, and in which the number of fuel cells in each group exceeds the number of fuel cells in any group downstream thereof in said fuel flow field; characterized by:

at least one fuel inlet means settable in either of two conditions, operable in a first condition to cause fuel to flow directly from said source only into said first group of fuel cells, and operable in a second condition to cause fuel to flow directly from said source into each of said groups of fuel cells without such fuel first flowing through any other group of fuel cells; and

at least one fuel outlet means settable in either of two conditions, operable in a first condition to cause fuel to flow directly to exhaust only from a last group of said fuel cells, and operable in a second condition to cause fuel to flow from each of said groups of fuel cells directly to exhaust without such fuel first flowing through any other group of fuel cells.

2. A fuel cell stack according to claim 1 wherein the number of groups is three.

3. A fuel cell stack according to claim 1 including a controller for selectively setting said fuel inlet means and said fuel outlet means into said first conditions during normal, electricity-

5 producing fuel cell operation, and for setting said fuel inlet means and
said fuel outlet means into said second conditions during purging of
said fuel cell stack.

4. A fuel cell stack according to claim 1 wherein said
fuel inlet means includes a valve between said source and said first
group and a valve between said source and at least said second and
third groups.

5. A fuel cell stack according to claim 1 wherein said
fuel outlet means includes a valve between said exhaust and said last
one of said groups and a valve between said exhaust and at least
said first and second groups.

6. A fuel cell stack according to claim 1 further
comprising:

fuel inlet and fuel exhaust manifolds; and wherein:

5 said fuel inlet means is between said source and said fuel
inlet manifold, and said fuel outlet means is between said fuel
exhaust manifold and said exhaust.

7. A fuel cell stack according to claim 1 further
comprising:

fuel inlet and fuel exhaust manifolds; and wherein:

5 said fuel inlet means is within said fuel inlet manifold, and
said fuel outlet means is within said fuel exhaust manifold.

8. A fuel cell stack according to claim 7 wherein said fuel inlet means and said fuel outlet means are rotatable between said two conditions.

9. A fuel cell stack according to claim 8 wherein said fuel inlet and exhaust manifolds are external to said fuel cell stack.

10. A fuel cell stack according to claim 7 wherein said fuel inlet means and said fuel outlet means are slidable between said two conditions.

11. A fuel cell stack according to claim 10 wherein said fuel inlet manifold and said fuel exhaust manifold are internal of said fuel cell stack.

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